LDS 3000
Installation Manual

Your eye in hell

Siemens Laser Analytics

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LDS 3000 Installation manual (Compatible with software LDS3k ver. 5.0)
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1. Introduction

This manual will describe the preparations and installation of an LDS 3000 and its sensors. It will also specify the environmental conditions and space requirements. All measurements in this manual are given in millimetres, centimetres or meters.

Before LDS 3000 and sensors can be installed flanges have to be welded into the measuring site, a mains connection has to be supplied for LDS 3000 etc. This is described in the chapter “Preparations”.

Hybrid cables are preferably installed before the LDS 3000 but not necessarily. How they are installed is described in the chapter “Hybrid cables”.

The installation of LDS 3000, installation and alignment of sensors are described in the chapter “Installation”.

Each measurement channel has to be tuned to the conditions on site, this is described in the chapter “Tuning”.

How to add or replace I/O modules is described in the chapter “I/O Modules”.

In the chapter “Documentation” there is a list of what parameters to document and what information to send to Siemens Laser Analytics. As an appendix there is an Installation report included (\\Dell\gemensam\Produktion\Service).

Finally there is a brief trouble-shooting guide.

2. Preparations

2.1 Flanges

Flange tubes have to be welded into the wall off the furnace or funnel as shown in the picture below. Flanges must be DN65/PN6 with an inner diameter of minimum 55 mm and maximum 70 mm.

The flange must protrude at least 100 mm from the wall and 0-30 mm into the furnace/funnel.

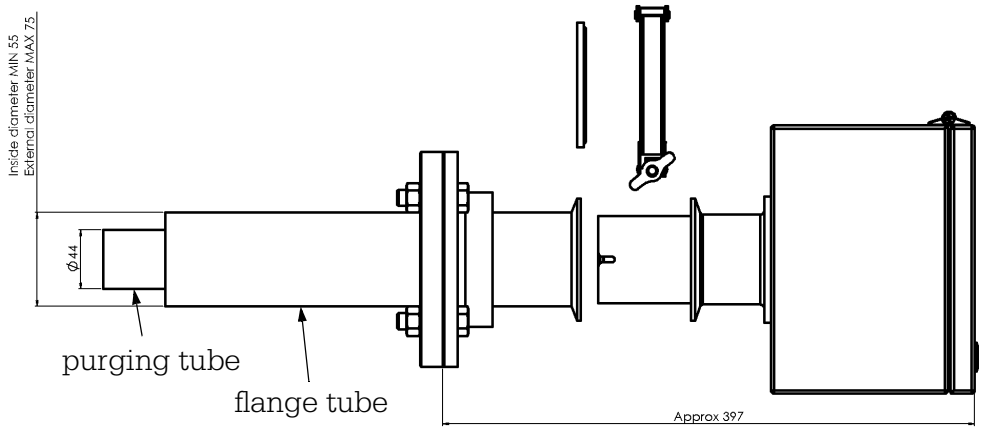
Flange tubes should never be longer than the purge tube. The standard purge tube from Siemens Laser Analytics is 360 mm, longer or shorter tubes can be supplied as an option. If the purge tube is shorter than the flange tube there could be a build up of dust in front of the purge tube that eventually blocks the light-beam.

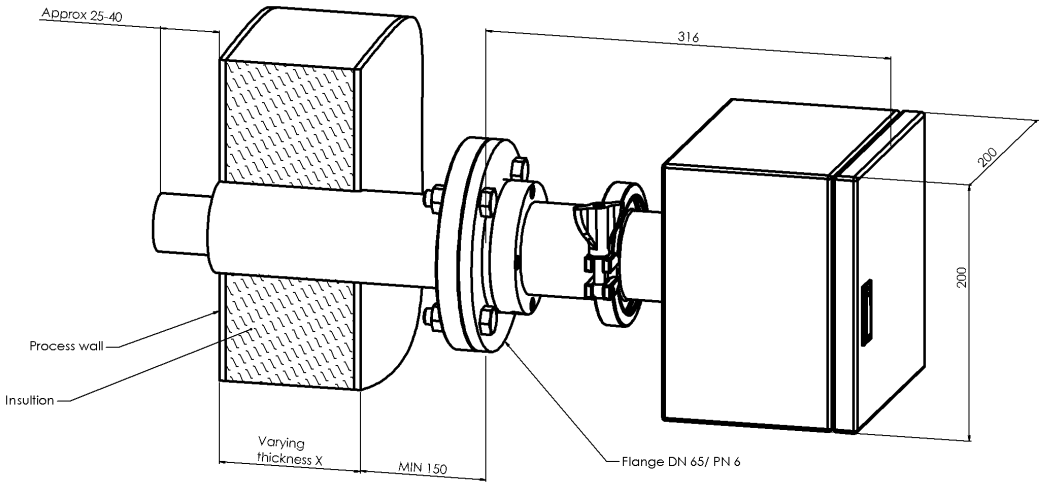
Flanges are not supplied by Siemens Laser Analytics.

Installation of flanges

When welding flange tubes it is necessary to have some sort of alignment tool. The alignment tool from Siemens Laser Analytics consists of a light source and an aiming device.

Make sure there is enough room for the sensor. Especially take into consideration that it should be easy to mount/dismount and that the sensors lid should be able to open fully. Safe working space around the sensors are also needed, guardrails, ladders, etc.





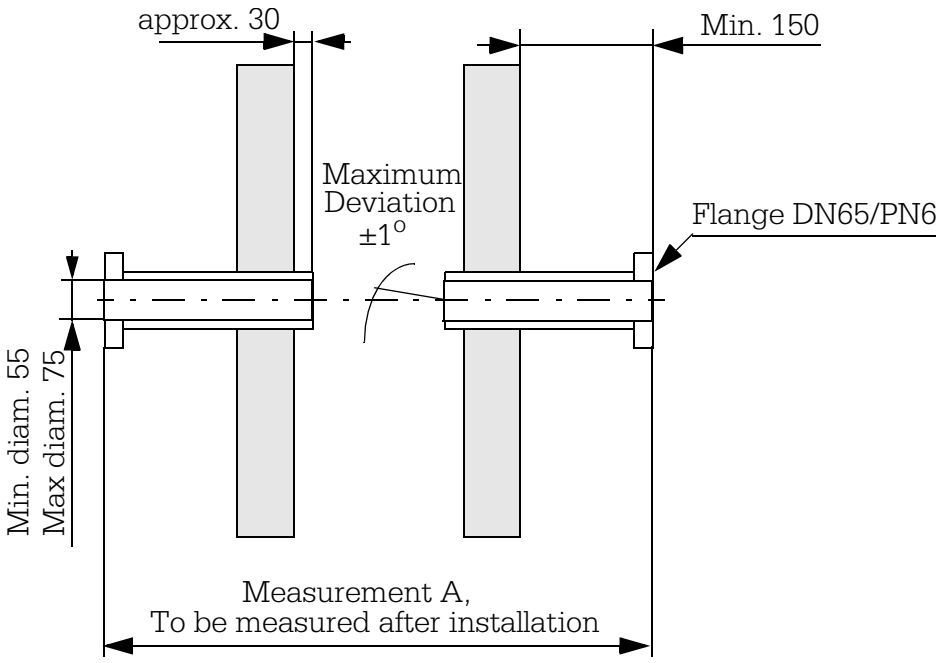
Weld the flange tubes loosely on each side of the wall. Do not weld them harder than that angle of the tubes can be adjusted with a hammer. Mount the light source on one flange and the alignment unit on the other flange. Focus the alignment unit until a clear light-spot is obtained. Adjust the angle of the flange tube until the light spot is centred on the cross-hair. Weld the tube with alignment unit permanently into this position.

Shift light source and alignment unit and repeat the procedure above until the other tube also is permanently welded.

When both flange-tubes are permanently fixed the deviation from the theoretical optical path must not exceed $\pm 1^{o}$.

When the flange-tubes are permanently installed, measure the distance between the inside of the flanges with an accuracy of at least ±10 mm. This distance will later be used by LDS 3000 when calculating the gas concentration.

There are applications where furnace walls move due to variations in temperature. If the furnace walls moves the sensors will be miss-aligned and the measurement interrupted. To solve this the sensor can be fixed to a girder or other structure that is not influenced by the temperature and the a flexible metal tube is fitted between the process-flange and the sensor-flange. Again the flanges fitted for the sensors must not deviate more than $\pm 1^{o}$.



2.2 Central unit LDS 3000

The LDS 3000 must be installed in a dust-free environment with a temperature between +10 °C and +30 °C and a relative humidity of max 85% non-condensing. If these conditions can't be fulfilled the LDS 3000 must be installed inside a cabinet with controlled environment. We strongly recommend a standard 19-inch rack mounting enclosure from the RITTAL range or equivalent.

Make sure there is at least 500 mm of free space behind the LDS 3000 to accommodate the signal- and hybrid cables and to allow opening of the door. The back side of the analyser must be accessible.

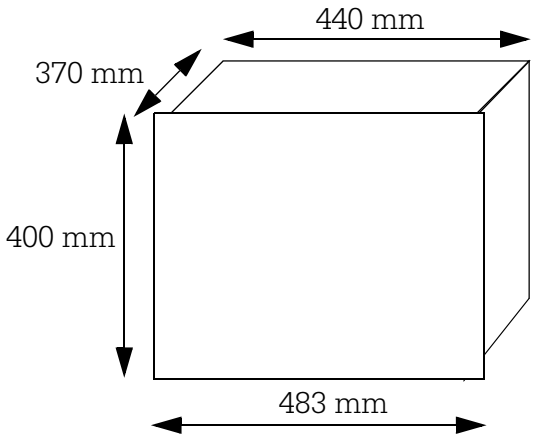
The LDS 3000 dissipates approx. 100 W of heat loss during normal in use conditions so make sure there is free air-flow around the LDS 3000.

Use at least M6 screws or equivalent to fix the LDS 3000 to rack.

The LDS 3000 requires 115/230 V 50-60 Hz earthed mains socket that is fused to 10 A. Depending on the safety level required equip the mains

with UPS and/or excess voltage protection.

Physical dimensions of the central unit for LDS 3000 (The mounting conforms to the 19 inch rack mounting system)



2.3 Hybrid cables

Always protect the single mode fibre (E2000 connector) from dust. Cables are supplied with a protective tube at each end and inside these a plastic protective cap for the single mode fibre.

DO NOT remove the protective tube until the cable is installed and ready to be connected to LDS 3000 and sensors. DO NOT remove the plastic protective cap until the cable is routed inside the LDS 3000/sensor.

Note!

All cables are marked with identification tags.

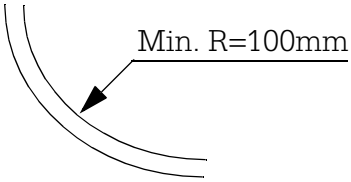
HXXA or HXXB where H means Hybrid-cable which can be used for all types of systems except oxygen. XX is the serial no. for the cable and A/B depends on the direction the cable is oriented. Before cables are shipped from Siemens Laser Analytics they are tested in both directions A to B and B to A, it does not matter which way the cable is installed. Hybrid cables are installed between LDS 3000 and transmitter sensor

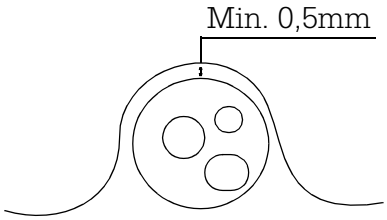
OXX are for oxygen systems only and is installed between LDS 3000 and transmitter sensors.

LXX are loop cables and are the same for all systems. Loop cables are installed between transmitter sensor and receiver sensor.

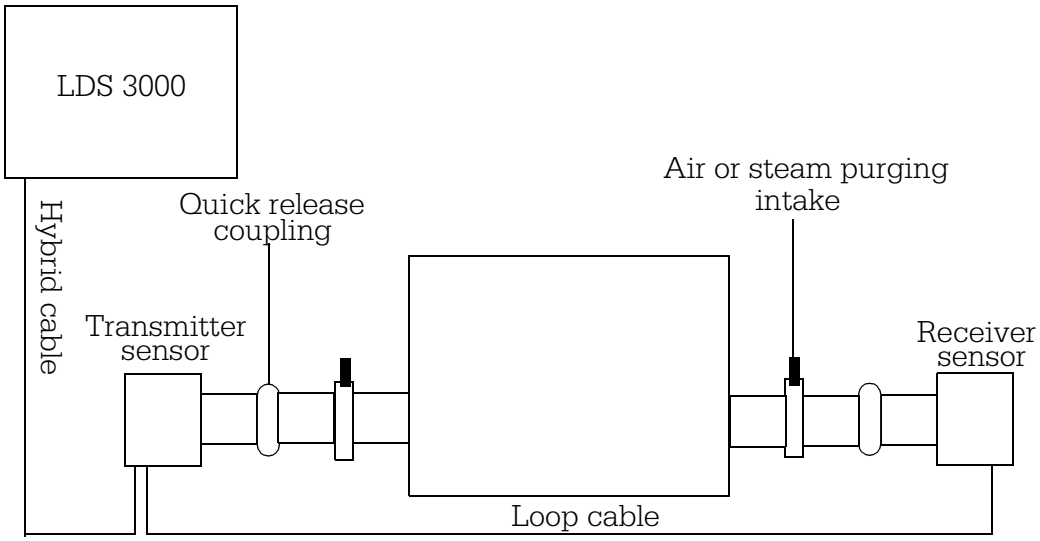
Cables should be installed so that they are protected from mechanical ware such as sharp edges or moving parts. Operating temperature for the cables are -20 to +70 ^{o}C, this refers to both ambient temperature and any parts the cable comes in contact with. The bending radius of the cable may never be smaller than 100 mm. If clamps are used there must be a minimum of 0.5 mm clearance between cable and clamp or use rubber coated clamps. Take extra care of hybrid cables for HCl systems since the cables are extra sensitive to the wave-length used in these systems.

Again, do not remove the protective end caps when the cables are installed. If the cables must be installed in tubes they have to be big enough to allow cabling without removing the end protection.


Min. R=100mm


Min. 0,5mm

3. Installation



Overview of an installation

3.1 Sensors

Do not install the sensors unless the purging air/steam is accessible. Never leave a sensor without purging since the lenses are easily damaged.

Mount the sensors, receiver and transmitter, with gaskets on the flanges and cross tighten the bolts.

Align the sensors in the following steps

1. Roughly align the adjustable flange so that the two discs are parallel.

2. Loosen the quick coupling and remove the receiver sensor.

3. Fasten the alignment plate with the quick coupling. The alignment plate is included in the alignment kit, part no.3020-2029 1A. Turn the flashlight on and mount it on the alignment plate. In dusty environments or long path-lengths use a stronger light-source such as a 55 W/12 V lamp or a visible laser, these are options supplied by Siemens Laser Analytics.

4. Remove the optical fiber launcher on the transmitter end and mount the cross-hair.

5. Align the transmitter with the four hexagon socket screws. Alignment is done by tightening and loosening screws cross-wise until the light dot is centred in the inner ring of the cross-hair. (Start with loosening all four screws)

The light dot should have a perfect round shape. If the light dot is oval or scattered it might be necessary to adjust the welded flanges or remove any objects that might be blocking the light-path.

Note!

Make sure that all screws are tightened when the sensor is aligned. Tighten the screws crosswise.

6. Move the flashlight/laser to the transmitter and replace the cross-hair.

7. Remove the alignment plate and remount the receiver sensor. Tighten

the quick coupling firmly. Remove the detector and replace it with the cross-hair.

8. Align the transmitter with the four hexagon socket screws. Alignment is done by tightening and loosening screws cross-wise until the light-dot is centred on the cross-hair.

Transmitter Sensor

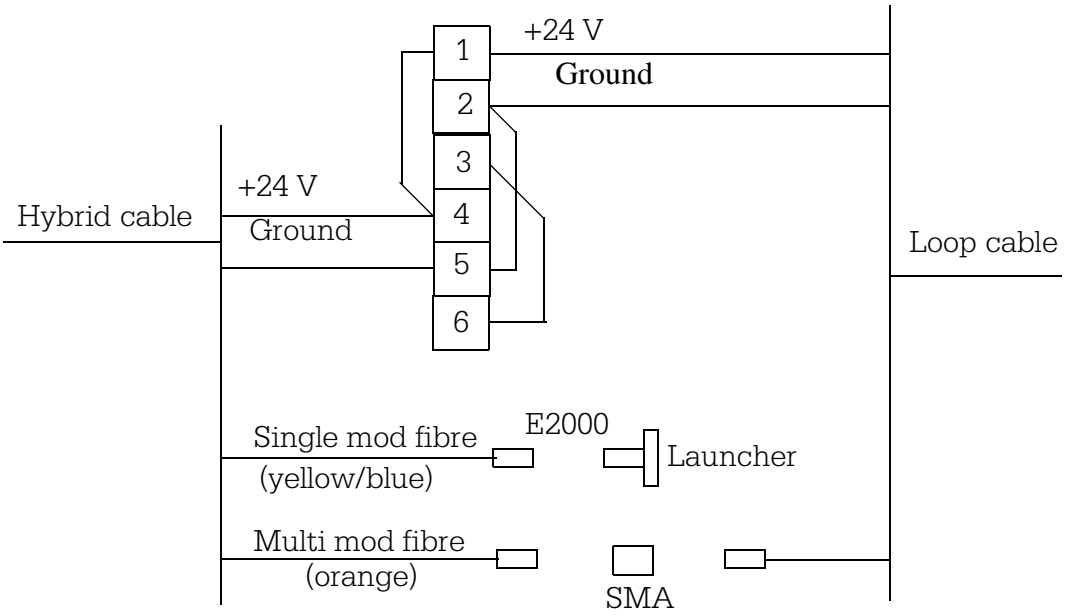
Always protect the single mode fibre (E2000 connector) from dust. Do not remove the plastic vial until the cable is firmly fastened in the sensor

Install the cables, hybrid and loop cable, at the transmitter sensor. Cables are fixed in the sensor with roxtech gaskets. Always use roxtech lubricant on the gaskets before installing otherwise these will be practically impossible to remove later. Multimode fibre (SMA connector) and 24 V are just connected straight through to the receiver.

Inspect and if necessarily clean the single mode fiber before connecting to the launcher (E2000 connector). This can be done by Siemens Laser Analytics trained personnel only. The single mod fibre connector (E2000) is very sensitive to dust so keep the protective cap on at all times when it is not connected to the launcher.

Note!

TRANSMITTER SENSOR ver. 3 and earlier



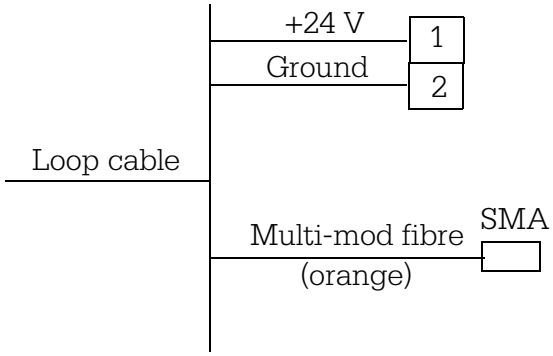
Receiver sensor

Install the loop cable in receiver sensor. Cables are fixed with a roxtech gasket. Always use roxtech lubricant on the gaskets before installing otherwise they will be practically impossible to remove later.

Attach the two pole Phoenix connector to the 24 V cable

From sensor boards ver 4.0 the DC/DC board is incorporated on the sensor board and polarity doesn't matter.

Connect the orange multi-mod fibre to the sensor-board.



Purging of lenses

Lenses can be purged with compressed instrument air, heated compressed air, blower-fan, steam or some applications with nitrogen or CO_2. For more detailed information see the technical specification.

Always install the purging before the sensors are installed to avoid damages on the lenses during the rest of the installation process.

For fan purging the sensors must be equipped with a "Fan purging adaptor" article no. 3040-2295, this is an option supplied by Siemens Laser Analytics. Minimum airflow at 20 mbar counter pressure should be 850 litre/min.

Compressed instrument air should have a pressure of 2-6 bars and be oil free. The sensor is supplied with a connector for semi-rigid tube with inner diameter of 4 mm and an outer diameter of 6 mm.

Steam must be at least 4 bars and overheated with a maximum temperature of 200 ^{o}C. There is a ISO 1/8" conical thread for connecting the steam. The connector for compressed air supplied with the sensors, together with a 6 mm steel tube, will work when purging with steam. When using steam make sure to always post the appropriate warning signs.

Heaters for compressed air are supplied by Siemens Laser Analytics as an option. These require 115/230 V, 50/60 Hz, 10/19 A.

See separate manuals for the different purging types.

Purging of sensor boxes and lens tubes

In oxygen applications it might bee necessary to purge boxes and lens tubes with an oxygen free gas such as nitrogen. See application manuals for further information.

3.2 Central unit LDS 3000

Hybrid cables

Always protect the single mode fibre (E2000 connector) from dust. Do not remove the plastic vial until the cable is firmly fastened in the LDS 3000.

Lead the hybrid cables through the intake holes on the back of LDS 3000. Channel 1 should be furthest to the left and then 2 and 3 moving right. Fasten the cables with Roxtech gaskets. Always use roxtech lubricant on the gaskets before installing otherwise they will be practically impossible to remove later.

Connect the multi-mod fibre (orange) to the SMA connector on the fibre-receiver. The fibre-receiver is the little silvery box just under the cable intake. Fibre-receiver for channel 1 is furthest to the left then channel 2 and 3 moving to the right.

Inspect and clean the single mode fiber (by Siemens Laser Analytics trained personnel only) before connecting to the E2000 connector on the opto-module. The opto-module is clearly visible. It doesn't matter which cable goes in which connector.

Connect the 24 V cable to the filter board right above the cable intake holes.

Keep the 24 V cable as short as possible inside the cabinet, preferably not longer than 14 cm.

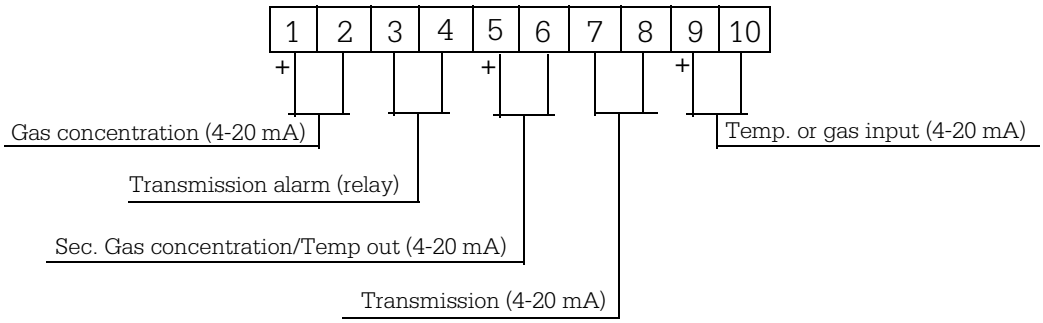
Note!

Output signals

On the back of the LDS 3000 there are three green 10-pole connectors, one for each channel. Pole 1 to 8 are output signals 4-20 mA or relay and 9 to 10 are input signals, 4-20 mA, when compensating for temperature or other gases. The relay for transmission alarm is normally closed.

For further information about I/O-modules se operators manual.

IMPORTANT: The gas signals on pole 1-2 and 5-6 are 0 mA if there is an instrument alarm, the LDS program isn't started or the instrument is switched off.



The picture above shows the standard configuration, but some instruments may differ.

3.3 Modem

The LDS 3000 has the facility to run "remote maintenance". With the LDSComm program installed on a PC it its possible to connect to the LDS 3000 via modem or null-modem cable. The LDSComm program can log measurement values and change settings on the LDS 3000.

Modem (normal phone or GSM) or null-modem is connected to the 9-pin 'D'-connector (male) on the back of LDS 3000.

LDS 3000 can use most types of modems provided they are HAYES compatible and can run 9600 bps.

Modems have to be purchased locally, Siemens Laser Analytics can not supply modems for use outside Sweden. Make sure the modem is supplied with a cable that has a 9-pin connector (female) that fits the LDS 3000.

The modem on LDS 3000 can never initiate communication it only answers incoming calls.

Setting the different types communication is done in the field "Comm. Type" in the COMMUNICATION window. GSM Nat is for use in Sweden only, Internal is not active, Local is for null-modem cable, External is for external modems and GSM Int is for GSM modems outside Sweden. Do "save settings" and restart LDS 3000 after changing comm. type to activate the setting.

4. Tuning

Most parameters are set at delivery but some adjustments have to be done on site. In the settings menu, measurement path length, temperature and pressure have to be checked. In the service menu, Transmission RMS and delta phase have to be checked and maybe adjusted slightly.

4.1 Settings

There are several parameters that can be set in a number of different menus, the ones described below are the most commonly used during installation and normal maintenance. For other settings please refer to the technical manual or contact Siemens Laser Analytics for advise. Be aware, if faulty settings are done in for instance the laser menu, permanent damage can be done to the LDS 3000.

Settings menu

In the settings menu the following parameters have to be checked/adjusted.

Path length: The measurement path length, in meters, is the distance between the flanges minus the length of the purging buffers. It is preferable if the correct (inner) length is supplied from the start since this distance can be difficult to obtain later. A discussion about the effective path length can be found in the Flange Installation Manual.

Gas temp: Enter the temperature, in degrees Celsius, of the gas to be measured. This value is used to compensate the measurement value. If it is not possible to set a temperature the automatic temperature compensation is set to ON and the LDS 3000 is expecting a 4-20 mA temperature input signal. See the chapter I/O modules on how to set the ranges.

Pressure: Is only active from software ver 5.2. Enter the pressure, in mbar, in the process. The compensation can also be automatic the same way as the temperature but this is rarely used.

Response time: The time during which samples are collected to form the average value displayed on the screen.

Unit: Select the desired unit. Options are ppm, vol.%, mgNm^{3}EU, mgNm^{3}US.

Scaling: Upper and lower set the limits of the 4-20 mA output and the bar presentation of the concentration.

Alarms: Transmission alarm is triggered if the transmission drops below the set value. Concentration alarm is triggered if the concentration value raises above the set value.

When all settings are done press Save Settings to store these on the flash disk.

Service menu

Delta Phase Set: See under 4.3 for a more detailed explanation. Adjustment should be done after the gain is adjusted.

Mean Filter: Averaging time for the absorption curves. Since an absorption curve is sampled 24 times each second and if mean filter is set to 1 the displayed curve will be an average of 24 samples.

IMPORTANT the response time should be the same for measurement channels and reference channel

General settings

Alarm Response: This determines what measurement value should be displayed when an alarm is activated. + indicates that regardless if there is an alarm or not only positive values will be displayed. - indicates that measurement values will be displayed even if it is negative.

+Zeroed=Displays 0 concentration.

-Zeroed=Displays 0 concentration.

Automatic Temp. Comp: ON, a 4-20 mA temperature input signal is used for automatic compensation or in the case of a O2/Temp instrument the internally calculated temperature is used for compensation. OFF, a temperature-value has to be manually entered.

Comp. Mode: Is today only used for water compensation, following options are available.

EXTERNAL, a 4-20 mA gas input signal is used for automatic compensation. There has to be an I/O module for the input signal.

INTERNAL, The internally calculated water value is used for compensation.

MANUAL, A manually entered water concentration is used for compensation

OUTPUT, The measured water value is sent as a 4-20 mA signal to another LDS 3000. There has to be an additional I/O module for this signal.

INACTIVE, No water compensation is used.

Settings for gas compensation

When using an input signal to compensate for a second gas, for instance compensating HCl measurements for the presence of water, there are two different menus to consider to get the settings complete. Limits can be set for the compensating second gas for what concentrations that are allowed and what value should be used if these limits are exceeded.

To set ranges and limits for the channels go to I/O Modules window (Main Window/Alarm Table)

Under “Ranges” C. Lo = the concentration corresponding to 4 mA. C.Hi = the concentration corresponding to 20 mA

Under “Limits” set CL.Lo to the lowest acceptable concentration and

CL.Hi to the highest acceptable

To set the concentration value to revert to if the limits are exceeded go to General Settings under the service menu.

1. Change Comp.Mode to manual and save settnings
2. Re-start the LDS program.
3. Change Comp.Mode back to external and save settings.
4. Re-start the LDS program.

When Comp.Mode is set to Output the only thing to adjust is the range of the signal so it corresponds to what the other LDS 3000 is expecting as an input. Ranges are set in the I/O Modules window (Main Window/ Alarm Table)

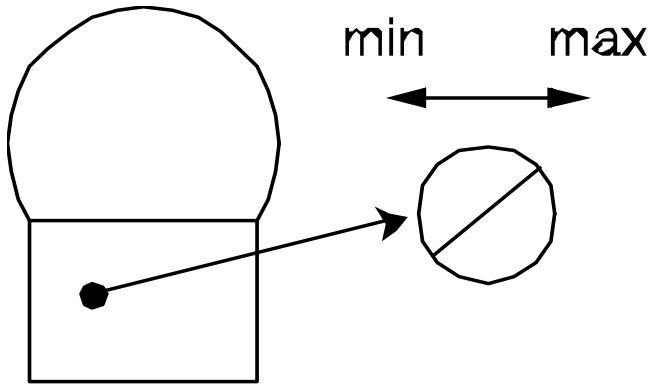
Under “Ranges” C. Lo = the concentration corresponding to 4 mA. C.Hi = the concentration corresponding to 20 mA

4.2 Adjustment of gain

Gain is displayed on the LDS 3000 service menu as Transmission RMS.

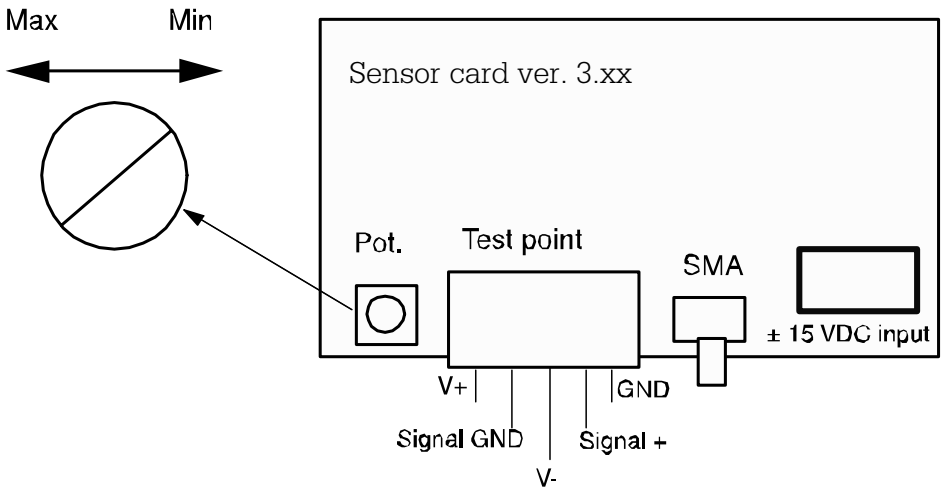
On systems with sensor cards older than ver. 3.xx there are three potentiometers for adjustment of the gain on each channel. From sensor cards ver. 4.0 and later the potentiometer on the sensor card is discarded.

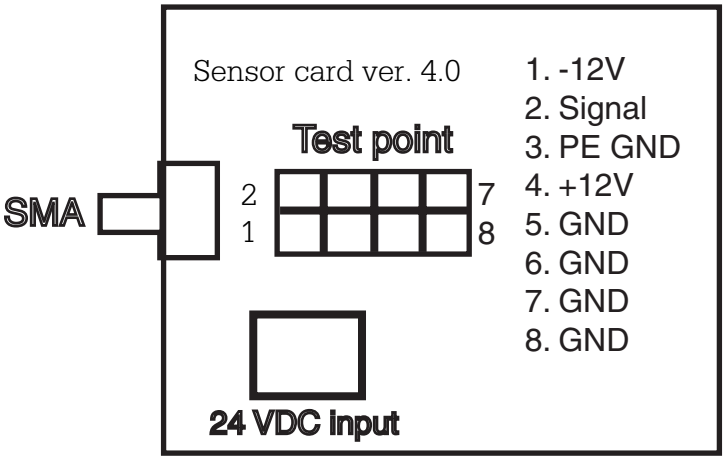
The first potentiometer is on the detector inside the receiver sensor.



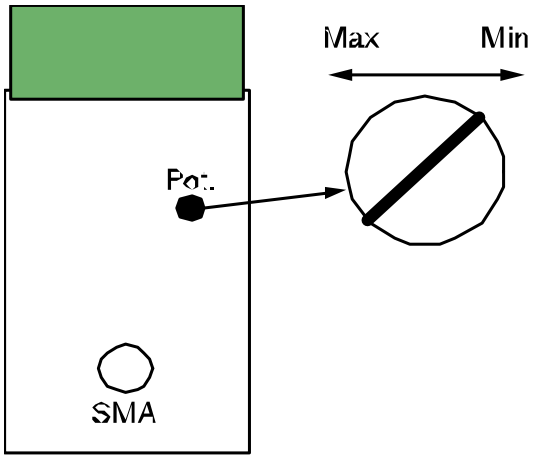
The potentiometer can be hard to see inside its hole and its is necessary to have a very small screwdriver to adjust it

The second potentiometer is on the sensor-card.





The third potentiometer is on the fibre receiver inside the LDS 3000, just under the cable intake holes.



Before start of adjustment set all potentiometers to a minimum.

The aim of the adjustment is to get the "Transm. RMS" reading on the LDS 3000 to 3000 in a dust and gas free environment or 1500-2000 when there is gas or dust present. This does not apply to systems measuring O_2. To guess the right value when the process is running can be quite tricky since we don't want the signal to be saturated when the process is turned off. Trial and error is unfortunately the only way to learn. The range of the Transmission RMS is 0-4095. If the transmission RMS reads 4095 it is saturated and the measurements will be inaccurate and unstable.

Start by adjusting the potentiometer on the detector. If this isn't enough continue with the potentiometer on the sensor card. While adjusting the gain always check the signal with an oscilloscope – a ~5.8 kHz sinewave. Connect the oscilloscope to pin 2 and 4 at the test point on sensor cards ver 3.xx and older or on a sensor card ver 4.0 on pin 2 and 5. The sinus signal should be undistorted and at a level of around 5 V_{pp}. If there is any distortion decrease the gain with the potentiometer on the sensor card until the signal is undistorted.

If gain needs to be increased further do this with the third potentiometer on the fibre receiver. If the gain is adjusted on the fibre receiver again the signal has to be checked with an oscilloscope but this time on the test points on the receiver board.

If it isn't possible to get the RMS value above 1000 and there isn't a very heavy dust load the sensors are probably not aligned properly.

4.3 Adjustment of delta phase

Adjustment of the delta phase is done in the service menu. Each channel has to be adjusted separately. There is a time delay on the Delta phase reading so change the Delta phase set slowly.

Adjust the "DeltaPh Set" so that the "DeltaPh." value is as low as possible, preferably a negative value. It should not be necessary to change Delta phase set more than ±200 units from the factory settings. The Delta phase set should if possible not exceed 100-2000.

If there are variations in the transmission due to dust or a high concentration of the measured gas it could be impossible to get the Delta phase below +200.

If it is not possible to adjust the Delta phase it is usually due to one of the following.

- The signal is saturated, see adjustment of gain above.

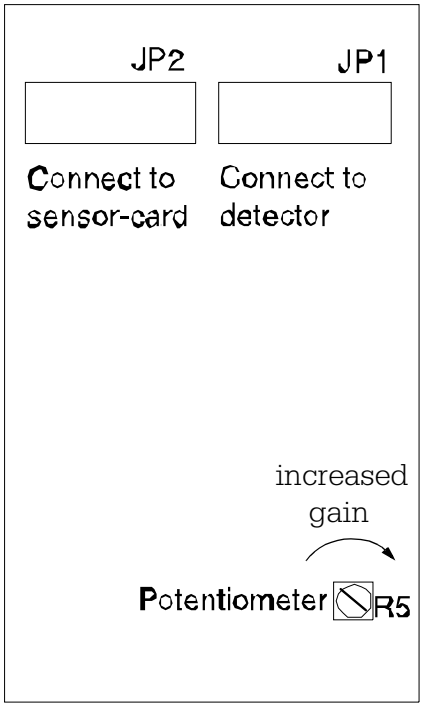
- There is no measurement signal, the only signal coming through is noise. The absorption line is very unstable. This could of course be due to a lot of things but mostly it is due to misalignment.

4.4 Adjustment of AGC-card

The AGC-card (automatic gain control) is used when there is a large and

variating dust-load.

When tuning the AGC-card the transmission conditions must be stable which usually means the plant has to be shut down.



To tune the AGC-card it must first be disconnected. Connect the detector directly to the sensor card and tune this as described above. With an oscilloscope connected to the sensor board note the p-p reading. If no oscilloscope is available note the transmission RMS. Connect the AGC-card and if necessary adjust the p-p value/RMS back to the noted value with potentiometer R5.

4.5 Save settings

When all settings and adjustments have been done press the “Set Nominals Measurement channels” in the service menus parameter settings and follow with “Save Settings”. This will set the normal values for the measurement channels and any changes can be detected, amongst other the RMS value in the main window is set to 100%.

5. I/O modules

The standard configuration in a 1-channel LDS 3000 is one RS232/RS485 converter (ADAM 4520/NUDAM 6520), one analogue output, 4-20 mA, for the gas concentration (ADAM4021/NUDAM6021) and one relay unit that inhibits the measurement value at an instrument alarm and supplies a transmission alarm (ADAM4060/NUDAM6060).

The ADAM and NUDAM modules are fully compatible in the LDS 3000 application an ADAM module can be replaced by a NUDAM or vice versa. In the following text the ADAM module number will be used.

On instruments with more than 1-channel one 4021 and one 4060 will be added for each channel.

As options the following modules can be added.

4021 for analogue output (4-20 mA) of secondary gas/temp or transmission.

4011 for analogue input (4-20 mA) of water/temp./pressure compensation.

5.1 Wiring

General for modules is:

1. That power is connected from the power supply to pins 9(+) and 10(-) with each row is connected in series, having a separate connection to the power supply.

2. That the communication bus (RS485) is connected to pins 7(+) and 8(-) and that is terminated in both ends by a 120ohm resistor. All modules are connected in series, starting with the 4520/6520.

IMPORTANT do not forget to move the resistor at the end of the communication bus if a module is added!

5.2 Connecting an I/O module

When an I/O module is added or replaced a new adress has to be programmed into the new module.There are addresses dedicated for all I/O modules depending on function and channel. These adress in HEX can be viewed in the LDS program in the menu “I/O Addresses” (from “Main Menu” to “Alarm table”) they are also attached as an appendix to this manual, both in DEC and HEX.

IMPORTANT: In the Adam program the address is entered as a decimal value.

How to program the address and other settings is described in the chapter “The ADAM software”.

5.3 The ADAM software

The ADAM program is installed on all LDS 3000. The ADAM program is used to set the adress, calibrate and set outranges of the I/O module. The

program is started from the DOS promt. To reach the DOS promt choose "More options" in the start up window.

Type ADAM and press enter. (C:\>adam)

The ADAM program will start by scanning through all addresses to detect connected I/O modules. Usually the scan can be stopped at 115 since there are no dedicated addresses above this. If a module is missing, dis-connect all other modules and scan again over the whole range to be sure a faulty adress hasn't been entered. If two modules have the same adress none of them will be found and other random faults will occur.

When the scan is done, a list of the modules found will be presented.

At the top there is a menu, and at the bottom is an explanatory text for each menu item.

COMport: Sets the communication port and baud rate. This should never be changed.

Search: Scans through all addresses to find I/O modules. The search can be stopped at any time by pressing any key.

Setup: In the SetUp there are two options, Module settings and Output data.

In Module Settings it is possible to change address, range, format etc. Move the cursor with the arrow keys to Search, press enter. Move with arrow keys to the module you wish to change and press enter. On some displays it might be difficult to see which module is high-lighted so count the number of times the arrow down key is pressed.

In Output Data it is possible to manipulate the output data, for instance switch relays on/off or get a current of somewhere between 4 and 20 mA.

Run: Displays the in or out data for a selected module.

Calibrate: Calibrates the selected module. Follow instructions given on the screen.

Terminal: ASCII command and response (never used).

File: Log module info to disk or file (never used).

Quit: Exits the Adam program.

5.4 ADAM 4011/NUDAM 6011 input module

The input module can handle input signals like mV, V and mA but in standard configurations only mA is used. The thermocouple is never used due to EMC regulations, the thermocouple probe works as an antenna as well.

In order to measure a mA input the module must be fitted with a 124 ohm resistor between pin 1 and 2.

Before the module is taken into use it must be calibrated first, see the chapter "The ADAM software". The output module 4021 could be used

to generate the 20 mA signal. Connect the out signal from the 4021 via a multimeter to the 4011. In "Output Data" under "Setup" adjust the output from the 4021 to 20 mA and then calibrate the 4011. This is also a convenient way of checking the module

DO NOT change any settings except for Adress and Input range.

Typical settings are:

Address: 49 (for temp on ch. 1)

Input range: ±20 mA (or ±15 mV to ±2,5 V)

Data format: Engineering unit

Baud rate: 9600

Checksum: Disable

Alarm Settings:Disable

High Alarm value:65,535 mA (since alarm is disabled it doesn't matter)

Low alarm value:-65,535 mA (since alarm is disabled it doesn't matter)

Clear latch alarm:NO

Clear event counter:NO

5.5 ADAM 4021/NUDAM 6021 output module

The input module can handle output signals like mV, V and mA but in standard configuration only mA is used.

The output signal is normally connected via relay 4 on the ADAM 4060 module. As a result the output signal will always be 0 mA if there is a fault in the LDS 3000. Before testing the module relay 4 must be set to ON in "Output Data" under "Setup", see the chapter "The ADAM software".

Test the module with a multimeter connected to pin 1 and 2. In the "Output Data" under "Setup" change OutData to 000HEX, the multimeter should now read 4,0 mA ±0,1 mA. Change the OutData to 800HEX, the multimeter should now read 12,0 mA ±0,1 mA. Change the OutData to FFFHEX, the multimeter should now read 20,0 mA ±0,1 mA. If the output signal is not according to the above, calibrate the module.

After testing set relay 4 back to OFF.

DO NOT change any settings except for Adress and Input range.

Typical settings are:

Address: 17 (Gas conc. for ch. 1)

Output range:4-20 mA (options 0-20 mA or 0-10 V)

Data format: Twos complement

Slew range: immediate change

Baud rate: 9600

Checksum: Disable

5.6 ADAM 4060/NUDAM 6060 relay module

The relay module has 4 separate relays.

Alarm L1, instrument alarm Relay 4

Alarm L2, low transmission Relay 3

Alarm L3, Gas 1, high concentrationRelay 2

Alarm L4, Gas 2, high concentrationRelay 1

Measurement signals are broken by relay 4 if there is a L1 alarm. If a secondary gas or temperature is measured a 2-pole relay is added. The 2-pole relay is activated by the 4060's relay 4 and breaks both primary and secondary gas signals.

DO NOT change any settings except for Adress.

Typical settings are:

Address: 33 (Alarm for ch. 1)

Baudrate: 9600

Checksum: Disable

From software ver. 5.1 this has changed according to the following list

L1 Instrument alarm Gas1

L2 Transmission alarm Gas 1

L3 Instrument alarm Gas 2

L4 Transmission alarm Gas 2

Thus the 2-pole relay is not necessary when two gases are measured.

6. Maintenance

The only maintenance done to LDS 3000 and its sensors is usually cleaning of lenses and occasional re-alignment of sensors.

6.1 Cleaning of lenses

Before removing sensors always make sure that:

-If there is steam-puring make sure the steam is turned of just before removing the sensor.

-No hazardous or hot gases can escape from the process.

-Gloves are worn if sensors are hot.

Remove the quick-coupling, no tools are needed, and the pull the sensor-box out.

The lenses have an anti-reflective coating that is sensitive to mechanical ware and is easily scratched. Remove all particles that could scratch the surface with pressurised air or by flushing with water. If the lens is hot allow it to cool down before flushing with water.

Clean the lens with a soft cloth or tissue and ethanol or window cleaner containing ammonia. Start at the centre of the lens and work circular movements towards the rim.

When re-installing the sensor make sure the guide pin fits the slot on the lens-tube. Replace the quick-coupling and tighten it by hand.

This operation should not affect the alignment but if in doubt do the last step of the alignment where the light is placed in the transmitter sensor and the receiver sensor is aligned. See 3.1

7. Documentation

The installation must be documented, this will greatly increase the ability of Siemens Laser Analytics to give support in the future. Complete the form and return it as soon as possible. At Siemens Laser Analytics there is a complete file for each instrument so all parts and calibrations can be traced. If all changes in “Settings Menu” and “Service Menu” are documented Siemens Laser Analytics can rebuild an identical instrument.

Siemens Laser Analytics will most of the time be able to log the system on request as long as there is a modem connected. The log-file is then saved for future comparison/trouble shooting.

On each and every new installation an *Installation report* and a *Service order* has to be written. These documents are supplied by Siemens Laser Analytics. Copies of the written reports must be sent back to enable future support.

8. Trouble shooting

Most faults are caused by mis-alignment of the sensors, dirty lenses or the light path being blocked by dust or other.

Fault: The transmission drops slowly (½h-days).

Cause 1: The lenses are getting dirty.

Actions: Clean the lenses and verify that the purging works.Try to improve the purging so the problem doesn't re-occur. If there is condensation on the lenses (ex.water or ammonia) fitting of a heater for the purge air should be considered.

Cause 2: There is a build up of dust in or in front of the purging tube.

Actions: Remove the dust pile. Try to improve the purging or install longer purge tubes

Cause 3: The sensors have moved due to changes in temperature or load.

Actions: Re-align the sensor, see the sensor manual.

Fault: The transmission drops suddenly

Cause1: There is no 24 V supply to the sensor card.

Actions: Check cables for mechanical damages. Check that there is 24 V out from the filter-board in the LDS 3000. Check that the AC/DC on the door of the LDS 3000 supplies 24 V out. The AC/DC is short-proof so if it's not operating, disconnect all cables on the output. If the AC/DC works after this, locate the short-circuit and fix it.

For sensor cards older than Ver. 4.0

Cause 2: The DC/DC board in the receiver sensor is broken.

Actions: Check that there is ±15 V out from the DC/DC board, if not replace it.

Cause 3: The detector or sensor card is broken.

Actions: Test that there is ±15 V on the sensor cards test point, if not replace sensor card and detector. It can be a bit troublesome to determine if the sensor card is faulty or there is no light coming through but by connecting a voltmeter (AC-mode) or an oscilloscope to the test-points pin 2 and 4 it is possible to see if there is a signal. The signal should be in the range 1-6 V. If not replace sensor card and detector but first confirm that you actually have a signal through the single-mode fibre and measurement path.

Cause 4: The fibre-optic cable is broken

Actions: Check the cables for mechanical damages. Check the multimod fibre by shining a flashlight in one and checking that the light is visible in the other end. The single-mode fibre can be checked by moving the detector and sensor card to the transmitter sensor. Place the launcher centred over the detector. If there is no transmission the single-mode ca-

ble or its connector is broken. This of course contradicts some of the things above because what if the sensor card is broken? The only sure way to tell if the single-mode fibre is OK is with an optical effect meter or OTDR.